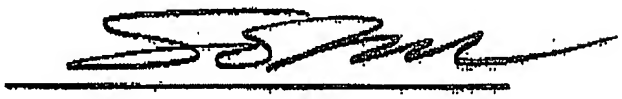
CERTIFICATION OF TRANSLATION

I, ***Dong-gy Sohn***, an employee of Y.P. LEE, MOCK & PARTNERS of The Koryo Bldg., 1575-1 Seocho-dong, Seocho-gu, Seoul, Republic of Korea, hereby declare under penalty of perjury that I understand the Korean language and the English language; that I am fully capable of translating from Korean to English and vice versa; and that, to the best of my knowledge and belief, the statement in the English language in the attached translation of ***Korean Patent Application No. 10-1998-0041758*** consisting of ***35*** pages, have the same meanings as the statements in the Korean language in the original document, a copy of which I have examined.

Signed this 13th day of February 2006



SPECIFICATION

[Title of the Invention]

RECORDING MEDIUM FOR STORING INFORMATION FOR STILL PICTURE, RECORDING AND/OR REPRODUCING METHOD AND APPARATUS THEREFOR

[Brief Description of the Drawings]

FIG. 1 illustrates a connection structure of various kinds of information and data in a moving picture;

FIG. 2 shows an example of an overall information structure according to the present invention;

FIG. 3 shows the relationship between various kinds of information and still picture data in a still picture according to the present invention;

FIG. 4 is a block diagram of a recording/reproducing apparatus according to the present invention;

FIG. 5 shows the relationship between still picture data and still picture group information according to the present invention;

FIG. 6 shows the relationship between cell information and still picture group information;

FIG. 7 illustrates the structure of still picture group information according to the present invention;

FIG. 8 is a table showing an example of detailed contents of still picture group general information shown in FIG. 7;

FIG. 9 illustrates the structure of a still picture map table shown in FIG. 7;

FIG. 10 is a table showing an example of detailed contents of a video map in the map table shown in FIG. 9;

FIG. 11 is a table showing an example of detailed contents of an audio map connected to the video map shown in FIG. 10;

FIG. 12 is a table showing an example of detailed contents of cell information for the still picture shown in FIG. 6;

FIG. 13 illustrates a flow chart showing a method for recording a still picture according to an embodiment of a present invention; and

FIG. 14 is a flow chart showing a method for reproducing a still picture according to an embodiment of the present invention.

[Detailed Description of the Invention]

[Object of the Invention]

[Technical Field of the Invention and Related Art prior to the Invention]

The present invention relates to recording and/or reproducing audio and/or video data using a rewritable recording medium, and more particularly, to a recording medium for storing for effectively processing a still picture and audio data added thereto, and recording and/or reproducing method and apparatus therefor.

FIG. 1 shows a connection structure of various kinds of information in a moving picture and moving picture data, in recording/reproducing audio and/or video data on a recordable and/or rewritable recording medium, specifically, a digital versatile disc (DVD), that is, illustrating the relationship between program chain (PGC) information 11 for treating data logically, moving picture information 12 consisting of video object (VOB) information, and a moving picture data file 13 in which actually compressed audio/video (A/V) data are recorded in VOB units.

First, terms used throughout the specification will now be described. Supposing a movie was recorded in the first and second series, the overall movie is a program chain and the first and second series are programs. Also, each program can be defined by further dividing the same into several cells which are sub-units. The information for each cell can define a video object (VOB) as a whole or partly. In such an event, each cell is used as a basic accessing unit during reproduction, and the program and PGC are only the information for connectivity between a plurality of cells.

Also, since data is actually sub-divided into video object units (VOBUs) and recorded in a moving picture data file, the VOB information consists of various kinds of information for the VOBU data, that is, VOBU #1, VOBU #2,.... and the VOB data in the moving picture data file is designated by the VOB information. Here, the VOB data is used as a random access unit of a disk recording/reproducing apparatus. The VOBU is based on a single GOP (Group of Picture) in the case of an MPEG (Moving Picture Experts Group) video, and audio data corresponding to video data are collected, that is, A/V data is multiplexed in units of sectors, to constitute a VOBU.

The data format shown in FIG. 1 is concerned with the moving picture, in which the unit of actual data is the VOB which is moving picture data for a constant time. Synchronization or encoding of A/V signals is performed in units of VOBs. However, in the case of a still picture, a sheet of a still picture constitutes a VOB. When a VOB is designated in a cell structure, a cell is necessary for each sheet of a still picture. Thus, the more the still picture is to be recorded, the more the information is added.

Generally, data errors may be generated if data is recorded on a recordable disk a predetermined number of times. Thus, there is a limit in the number of recording data on a disk. Every information data for limiting the number of recording times and rapidly accessing data is stored in a memory of a controller for controlling the system. However, as described above, in the case of a still picture, if the amount of information is increased, much time is required for reading the information data. Also, there is a limit in storing the whole information in a memory with a limited size. Accordingly, it is not possible to record a large-capacity still picture.

[Technical Goal of the Invention]

To solve the above problems, it is a first object of the present invention to provide a recording medium for effectively storing still picture group information for separating a large-capacity still picture into a plurality of groups to manage the same.

It is a second object of the present invention to provide a recording medium for generating still picture group information comprised of video data for a still picture or

video data for a still picture having audio data added thereto, and audio data, in a recording order of recorded bitstreams and storing the same.

It is a third object of the present invention to provide a method for recording still picture group information for separating a large-capacity still picture into a plurality of groups to manage the same, and cell information related to reproduction, and reproducing the still picture according to the recorded information.

It is a fourth object of the present invention to provide a method for recording still picture group information comprised of video data for a still picture or video for a still picture having audio data added thereto and audio data, and cell information related to reproduction, and reproducing the still picture or the still picture having audio data added thereto according to the recorded information.

It is a fifth object of the present invention to provide an apparatus for recording still picture group information for separating a large-capacity still picture and audio data added thereto into a plurality of groups to manage the same, and reproducing the still picture or both the still picture and the audio data added thereto according to the recorded information.

To achieve these objects, there is provided a recording medium including: a first region having data for a plurality of still pictures; and a second region having still picture group information for separating the still picture data in the first region into a plurality of groups within a predetermined maximum number to manage the same.

According to the present invention, there is provided a method for recording and/or reproducing audio and/or video data on a writable and/or rewritable recording medium including: (a) recording a plurality of input still pictures; and (b) separating the plurality of still pictures into a plurality of groups within a predetermined maximum number and recording still picture group information and playback information related to reproduction.

Also, the method may further include the steps of: (c) reading still picture group information to be reproduced in accordance with the playback information; and (d) calculating the position of a desired still picture in accordance with the read still picture

group information and reproducing the still picture data being at the calculated position.

According to another aspect of the invention, there is provided a reproduction method of a recording medium including a first region having data for a plurality of still pictures, a second region having still picture group information for separating the still picture data in the first region into a plurality of groups within a predetermined maximum number to manage the same, the reproduction method comprising the step of reproducing the still picture data in the first region, based on the still picture group information in the second region.

According to another aspect of the invention, there is provided an apparatus for recording and/or reproducing audio and/or video data on a writable and/or rewritable recording medium, the method including: a recording processor for signal-processing a plurality of still pictures to be recorded on a first region on the recording medium; and a controller for generating still picture group information for separating still pictures in the first region into a plurality of groups with a predetermined maximum number to manage the same and playback information related to a reproduction order, and controlling the generated information to be recorded on a second region.

Also, the apparatus may further include a playback processor for reproducing still picture data in the first region based on the still picture group information.

[Structure and Operation of the Invention]

Hereinafter, preferred embodiments of recording media for storing the information for a still picture, and recording and/or reproducing method and apparatus therefor, will be described.

FIG. 2 shows an example of an overall information structure according to the present invention, in which information data consisting of PGC information, moving picture information and still picture information can be recorded on an information file or an information area.

Here, PGC general information contains information such as the number of programs in a PGC. Program general information contains information such as the

number of cells in a program. The cell information designates a VOB in the case of a moving picture, as shown in FIG. 1, and designates a still picture VOB group (to be abbreviated as "still picture group" briefly) instead of a VOB, in the case of a still picture, as shown in FIG. 3. Since the moving picture information has already been described with reference to FIG. 1, the description thereof will be omitted herein and still picture information according to the present invention will now be described. Still picture general information contains information for the number of still picture group information.

FIG. 3 shows the connection structure of various kinds of information and still picture data in a still picture. In other words, in the still picture recorded in units of VOBs on a data file, a plurality of VOBs for still pictures are managed by a still picture group, and cell information contained in the PGC information 21 designates still picture group information (GVOB), not a single VOB information. Also, audio data may be recorded in addition to the still picture. The audio data is recorded consecutively after the still picture is recorded, thereby reducing a search time of a reproducing head during reproduction. The audio data recorded together with the still picture is called audio data, which is contained in the still picture group. In the present invention, unless specifically defined, a still picture represents both one having only a video part and one having the audio part and the video part.

By managing the still picture by grouping the same in such a manner, the numbers of cell information and still picture information can be reduced. For example, video coding attributes or audio coding attributes in a still picture group are assimilated to be made still picture group general information and stored as common information. For the respective still pictures, the positions thereof in the still picture data file must be indicated. In the case when the still pictures are not separated into a plurality of groups, the starting positions of the respective still pictures must be indicated. However, in the case when the still pictures are grouped, the starting position at which the pertinent still picture group starts to be recorded in a file is stored in the still picture group general information and then only the sizes of the respective still pictures are

recorded as the information for the respective still pictures. Since the amount of information indicative of the size of still picture data, i.e., the number of bytes, is generally less than that indicative of the position in a file, the overall amount of information can be reduced.

In order to search a recording position of a specific still picture in the still picture group, the starting position of the still picture group data contained in the still picture group general information is added to the size of the data preceding the still picture to be searched. Also, in order to read audio data added to a still picture, the still picture being at the searched position is added to the size of video parts of the still picture.

In the case of a still picture group, video parts and audio parts are consecutively recorded in a file or space. Thus, the video information and the audio information each containing the size thereof are also recorded in a bitstream order in which the video data and the audio data are actually recorded. Thus, the respective regions shown in FIG. 3 can exist in the form of still picture file 23 to which audio data may be added, and information file containing cell information contained in the PGC information 21 and still picture information 22. The still picture file 23 can be designated by a first region, and the information file containing the PGC information 21 and the still picture information 22 can be designated by a third region which is a logic region.

FIG. 4 is a block diagram of a recording/reproducing apparatus for implementing the present invention. The function of an apparatus for recording/reproducing A/V (audio/video) data using a recordable and rewritable disk is largely divided into recording and reproduction.

During a recording time, an AV codec 110 compression-codes an externally applied A/V signal by a predetermined compression scheme and supplies size information for compressed data. A digital signal processor (DSP) 120 receives A/V data supplied from the AV codec 110, adds additional data for ECC (error correction code) processing thereto and performs modulation using a predetermined modulation scheme. A radio frequency amplifier (RF AMP) 130 converts electrical data supplied from the DSP 120 into an RF signal. A pickup 140 drives a disk and records the

optical signal supplied from the RF AMP 130, incorporating an actuator for focusing and tracking. A servo 150 receives information necessary for servo control from a system controller 160 and performs a stable servo operation. The system controller 160 controls the overall system through interfacing with a user to thus control the still picture to be recorded on the disk and record separate information for the recorded still picture. Still picture data are managed in units of groups by constructing the still picture group information comprised of the information for the respective still pictures, including the size of the still picture data, the size of audio data, the playback time of audio data and the like, and the position information of the respective still pictures, in the recording order of recorded still pictures and audio data. Cell information concerning the reproduction order is recorded as well as the above-described information. The cell information contains the information indicative of the recorded still picture group so that the recorded still picture and audio data can be reproduced.

During a playback time, the pickup 140 picks up the optical signal from the disk having data stored therein and the data is extracted from the optical signal. The RF AMP 130 converts the optical signal into an RF signal and extracts a servo signal for performing a servo operation and modulated data. The DSP 120 demodulates modulated data supplied from the RF AMP 130 corresponding to a modulation scheme used during modulation, performs ECC process to correct errors and eliminates added data. The servo unit 150 receives information necessary for servo control from the RF AMP 130 and the system controller 160 and performs a stable servo operation. The AV codec 110 decodes the compressed A/V data supplied from the DSP 120 to output an A/V signal. The system controller 160 controls the overall system for reproducing user's desired data (still picture only, still picture + audio data or still picture + audio data) using the cell information and still picture group information stored on the disk while performing user interfacing such as processing of user's key inputs.

In other words, in order to reproduce a specific still picture and audio data, the still picture group information having the still picture to be reproduced is obtained from the cell information, the information such as the size of the still picture data or the

information for the data size and playback time of audio data, if any, is obtained from the still picture group information, thereby reproducing only desired data.

Here, the A/V codec 110, the DSP 120, the RF AMP 130 and the pickup 140 operating during a recording time can be referred to a recording processor. Also, the pickup 140, the RF AMP 130, the DSP 120 and the A/V codec 110 operating during a playback time can be referred to a reproduction processor.

FIG. 5 shows the relationship between still picture data and still picture group information, in which the information for a plurality of still pictures (e.g., 64 maximally) having the same attributes is recorded in the respective still picture group (GVOB) information 201. The number of the still pictures forming each still picture group is determined within the limit of the maximum number of still pictures. Each still picture group information 202 includes still picture group general information and information for the respective still pictures and is information for still picture data 203 composed of video parts or video or audio parts in a sequence of bitstreams recorded. The still picture group generation information has a start address of the corresponding still picture group.

Also, as information for the respective still pictures, still picture information having audio data exists in the form of map information composed of video part information for video parts and audio part information for audio parts. Here, a video map and an audio map for a still picture have the same identification information. If the still picture information is composed of only video parts, it exists in the form of a map having only the video part information. Here, a sheet of still picture data is recorded on a VOB.

FIG. 6 shows the relationship between cell information (which can also be referred to as playback information) and still picture group information, in which a cell is a logical unit in relation to indication of a reproduction order. The cell information includes still picture group identification information (GVOB_ID), still picture reproduction start identification information (START VOB_ID) in the corresponding still picture group and still picture reproduction ending identification information (END

VOB_ID). The cell information may correspond to the entire still picture groups or may apply for some of still picture groups which are intended to be reproduced.

FIG. 7 illustrates the structure of still picture group information according to the present invention, which includes still picture group general information and a still picture map table and may further include attribute information for a still picture such as picture sizes or video encoding modes.

FIG. 8 is a table showing an example of detailed contents of still picture group general information shown in FIG. 7, which includes GVOB_ID representing information for identifying a still picture group in a still picture file, GVOB_S_ADR representing a start address of first still picture data in the corresponding still picture group in the still picture file, GVOB_Ns representing the number of still pictures in the still picture group, and so on.

Here, the identification information GVOB_ID can be expressly recorded as a unique one for each still picture group in a still picture file or can be suggestively indicated in the order of still picture groups, that is, #1, #2,...

FIG. 9 illustrates the structure of a still picture map table shown in FIG. 7. There are two types of maps; one is video maps VMAPs for video parts and the other is audio maps AMAPs for audio parts added to a still picture. The order of maps are the same as that of data of recorded bitstreams in a still picture file as shown in FIG. 5. Thus, in the case when a still picture has only video parts, there are only video maps. In the case when a still picture has audio data added to the video parts, both video maps and audio maps are recorded and are practically considered as one map using the same identification information.

FIG. 10 is a table showing an example of detailed contents of a video map in the map table shown in FIG. 9, containing MAP_TY indicating the type of a corresponding map and represented by a binary "0" in the case of a video map for video parts, VOB_ID indicating identification information for the video parts and ranging from 1 to 64 in preferred embodiments. Also, VOB_ID can be expressly indicated or suggestively indicated in the recording order, that is, #1, #2, #3,... Also, the video map contains

V_PART_SZ indicating the size of a video part. Here, VOB_ID and V_PART_SZ can be referred to as still picture position information.

FIG. 11 is a table showing an example of detailed contents of an audio map, containing MAP_TY indicating the type of a corresponding map and represented by a binary "1" in the case of an audio map for audio parts, A_PBTM indicating the playback time of an audio part and A_PART_SZ indicating the size of an audio part.

FIG. 12 is a table showing an example of detailed contents of cell information for the still picture shown in FIG. 7, containing S_GVOB_ID indicating identification information for a still picture group, S_VOB_ID indicating identification information for a still picture starting to be reproduced, and E_VOB_ID indicating identification information for a still picture ending to be reproduced.

FIG. 13 illustrates a flow chart showing a method for recording a still picture according to an embodiment of a present invention, that is, a method for recording a still picture and audio data. First, a still picture or both a still picture and audio data is set to be recorded (step S101). Still picture group information is generated, identification for a still picture group is allocated, the number of still pictures in the still picture group is set to "0" and the start address of the still picture group in a still picture file is recorded (step S102). It is determined whether a recording start signal of a still picture is input by a user or not (step S103). If the recording start signal is input, the still picture is recorded on the still picture file, identification information for the still picture is allocated to the still picture group information, the number of still pictures in the still picture group is increased by one and the size information of the still pictures is recorded in the video map (step S104).

It is determined whether or not a user's set mode is for recording both a still picture and audio data (step S105). If yes, the audio data for the still picture is recorded following after the corresponding still picture on the still picture file and the audio size information is recorded on an audio map in the still picture group information (step S106).

It is determined whether the number of still pictures recorded is enough to constitute the information for a still picture group (e.g., 64 maximally) (step S107). If the still picture group information is completed, the procedure returns to step S102 to generate another still picture group information. Otherwise, the procedure proceeds to step S103 to determine whether a recording start signal of a still picture is input by a user or not.

If the user's set mode is for recording only a still picture in step S105, step S106 is skipped and the procedure proceeds to step 107 to record a next still picture. If a recording start signal of a still picture is not input by a user in step S103, it is determined whether recording is terminated or not (step S108). If it is determined to terminate recording, cell information is recorded and the procedure ends (step S109). Here, the cell information is created for every still picture group so as for all still pictures to be reproduced.

FIG. 14 is a flow chart showing a method for recording a still picture according to an embodiment of the present invention, that is, a method for reproducing a still picture and audio data added thereto.

Referring to FIG. 14, first, PGC information and cell information are read (step S201). Identification information for a still picture group to be reproduced, playback start identification information and playback ending identification information are read from the cell information to read the still picture group information pointed by the cell (step S202). Video map information for the video part corresponding to the playback start identification information in the read still picture group information is obtained to read the size of a video part, or both video map information and audio map information are obtained in the case of a still picture having audio data to read the size of a video part and the size of an audio part (step S203).

The position of a desired still picture is calculated by the read video part information and video data being at the calculated position is read and decoded to reproduce the still picture (step S204). Here, the position of a desired still picture is obtained by summing the start position of a still picture group and the size of data

preceding the desired still picture. While the still picture is reproduced, it is determined whether audio data is added to the still picture (step S205). If yes, the audio data is read and decoded to reproduce the audio data (step S206). Here, the reading position of the audio data is obtained by summing the calculated position of the still picture and the size of video parts of the still picture. It is checked whether all still pictures belonging to a cell are reproduced or not using the cell information and then it is determined whether or not there is a still picture to be reproduced next (step S207). If yes, the information for the video part of a still picture to be reproduced next is read (step S203). Otherwise, the procedure is terminated. In the case when there are a plurality of series of cell information, this routine is repeated.

Here, the step of determining whether audio data is added to a still picture (step S205) may be performed directly after the step of reading the still picture group information (step S202). This is because it is possible to determine that audio data is added to a still picture in the case when an audio map for audio parts is added subsequently to a video map for video parts, in accordance with the still picture group information.

Before reproduction, a reproduction mode may be set by interfacing with a user to determine whether only a still picture is to be reproduced, or both a still picture and audio data are to be reproduced.

[Effect of the Invention]

As described above, according to the present invention, a plurality of still pictures and audio data added thereto can be recorded and/or reproduced using minimum information by storing still picture group information for separating the plurality of still pictures and audio data into a plurality of groups within a predetermined maximum number to manage the same.

Also, according to the present invention, since the still picture group information includes still picture group general information as the common information of in a recording order of bitstreams of still pictures and audio data added thereto, and video

part information and audio part information are constructed for each still picture in the still picture group, effective management of information can be performed.